REMARKS:

1) The Examiner's attention is directed to the enclosed "Declaration of Unexpected Results Under 37 CFR 1.132", which will be discussed below.

2) In accordance with the PCT procedures, the original specification of this application was a direct literal translation of the foreign language text of the corresponding PCT International application. A few clarifying amendments have now been made in the translated text. For example, in various text passages, it has been clarified that the original recitations in the format of "W-30% by weight" mean "30% by weight of W" and the like. A few minor typographical errors have been corrected. These corrections and clarifications are supported by the substance and the context of the original disclosure, and do not introduce any new matter. Entry of the specification amendments is respectfully requested.

3) Further according to the PCT procedures, the original claims of this application were a direct literal translation of the foreign language claims of the corresponding PCT International application. The translated claims have now been editorially amended for streamlining and simplifying the original translated text, for better conformance to typical US claim style and practice. These editorial amendments are not submitted for reasons of patentability, and do not narrow or otherwise affect

the scope of the claims, but are merely submitted for streamlining of the translated text as mentioned above.

4) Moreover, the claims have further been amended as follows.

Independent claims 1, 10, 19, 28 and 37 have each been amended to more-clearly account for the optional content of Ni as set forth in original dependent claims 8, 17, 26, 35 and 44. Those dependent claims have now been amended to more clearly and expressly recite that the electrode material contains a positive amount of the Ni.

Further in this regard, new dependent claims 46 to 55 have been added to expressly exclude the optional content of Ni from the composition of the W-Cu alloy. That is in accordance with original independent claims 1, 10, 19, 28 and 37 without the further subject matter of original dependent claims 8, 17, 26, 35 and 44. Thus, the new claims do not introduce any new matter.

Independent claims 10, 19 and 37 have been substantively limited by reducing the recited mean interparticle spacing from "at most 20μm" to --at most 14μm-- in accordance with inventive Sample 3 reported in Table 1 on page 17 of the present specification. Thus, this amendment does not introduce any new matter.

Entry and consideration of the claim amendments are respectfully requested.

5) Referring to page 2 of the Office Action, the rejection of claims 1 to 45 as anticipated by, or alternatively obvious over, US Patent 4,027,134 (Arakawa et al.) is respectfully traversed.

Arakawa et al. disclose an electrode for electrical discharge machining, formed of a tungsten-based alloy including 15 to 40% by weight of Ag and/or Cu, and 0.5 to 10% by weight of CrO_2, and another additive such as Y_2O_3 and/or ThO_2 may be used. Arakawa et al. disclose a reference composition of 65% W, 30% Cu, and 5% Y_2O_3. The alloy for the electrode is processed by sifting powder particles through a 325 US standard mesh sieve so that the powder particles all have a particle size nominally less than 45μm with a maximum individual size of 66μm (standard sieve designation of US mesh size 325) (also see the applied Slabbekoorn et al. reference). Arakawa et al. do not disclose the interparticle spacing of the additive component particles.

In view of the above prior art, the Examiner has asserted that the disclosed powder particle size below 325 US standard mesh meets the presently claimed particle sizes, because the claimed size range of particles having a mean particle diameter of less than 3μm (see present claims 1, 19 and 28) is encompassed within the broad range (nominally less than 45μm) disclosed by the reference. Furthermore, the Examiner has asserted that the presently claimed interparticle spacing (mean interparticle spacing of at most 14μm recited in present claims 10, 19 and 37) would inherently be expected to be met in the reference because allegedly "*inter-particle size will be the same or less than particle size*". These assertions of the Examiner are respectfully traversed for the following reasons.

As explained in MPEP 2131.03(II), there is no clear anticipation if the prior art reference does not disclose any

specific examples falling clearly within the claimed range, but rather merely discloses a range that overlaps the claimed range.

> "In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with 'sufficient specificity to constitute an anticipation under the statute'. ... If the claims are directed to a narrow range, the reference teaches a broad range, and there is evidence of unexpected results within the claimed narrow range, ... it may be reasonable to conclude that the narrow range is not disclosed with 'sufficient specificity' to constitute an anticipation of the claims. The unexpected results may also render the claims unobvious." (MPEP 2131.03(II)).

On the other hand, when a claimed range overlaps or lies within a range broadly disclosed by the prior art, a prima facie case of obviousness exists, but such prima facie obviousness can be rebutted by applicant's showing of the criticality of the claimed range, generally by showing that the claimed range achieves unexpected results relative to the prior art range. In this regard, see MPEP 2114.05(I) and 2114.05(III). Furthermore, if the range disclosed in the prior art is a broad range encompassing a great number of particular compositions in addition to and outside of the newly claimed range, then the broad prior art range cannot be regarded as establishing the obviousness of the narrower claimed range critically achieving unexpected results within the disclosed broad range. See *Atofina v. Great Lakes Chemical Corp.*, 78 USPQ2d 1417 (Fed. Cir. 2006); *In re Peterson*, 65 USPQ2d 1379 (Fed. Cir. 2003); *Minnesota Mining*

& Manufacturing Co. v. Johnson & Johnson Orthopaedics, Inc., 24 USPQ2d 1321 (Fed. Cir. 1992).

In the present case, Arakawa et al. teach a particle size range (below 325 US standard mesh) that is **so broad as to be meaningless** in comparison to the much smaller and narrower size range (mean particle diameter less than 3μm) recited in present claims 1, 19 and 28. Namely, the standard US mesh size 325 has a nominal standard sieve designation of 45μm with a maximum individual mesh opening of 66μm. Thus, the powder sifted through the sieve according to Arakawa et al. will have a nominal particle size below 45μm but may include some individual particles up to 66μm in size. The teaching of a particle size broadly below 45μm is 1500% of, or 15 times, the maximum mean particle diameter (namely less than 3μm) recited in present claims 1, 19 and 28. There is no indication by Arakawa et al. that the electrode materials shall actually contain such extremely small particle sizes especially of the additive components, or that such extremely small particle sizes of the additive components should be investigated for potential improved results.

The present application has demonstrated for the first time that **unexpected and substantially improved results** can be achieved when particles of additive elements with a very small mean particle diameter are combined with the tungsten and copper of the basic W-Cu alloy (see the present specification at page 3 lines 12 to 28, and compare the comparative Samples 7, 10 and 13 with the inventive Samples 1 to 6, 8, 9, 11 and 12 reported

in Tables 1 and 2 on pages 17 and 18 of the present specification). As can be seen in Tables 1 and 2 on pages 17 and 18 of the specification, the inventive samples having mean particle diameters less than 3μm achieve an improved electrode performance, i.e. an improved (reduced) electrode wear rate for a given or improved (increased) machining rate.

Still further, the enclosed "Declaration of Unexpected Results Under 37 CFR 1.132" describes comparative testing that has been carried out specifically to compare samples prepared according to Arakawa et al., with the inventive Sample 1 according to Table 1 on page 17 of the present application. Particularly, comparative Samples (i), (ii) and (iii) were prepared according to the preparation method of the Arakawa et al. reference. Comparative Sample (i) of the enclosed Declaration is equivalent to Sample number 6 in Table 2 of Arakawa et al. Comparative Sample (ii) of the enclosed Declaration has a composition of inventive Samples 1 to 3 in Table 1 on page 17 of the present application, but was prepared by the manufacturing method described by Arakawa et al. Comparative Sample (iii) of the enclosed Declaration has the same composition as that of inventive Sample 5 in Table 1 on page 17 of the present application, but was prepared by the manufacturing method disclosed by Arakawa et al. These comparative samples were evaluated in the same manner and as to the same characteristics as described in relation to Table 1 of the present application, and the results of this evaluation are shown in the table on page 5 of the enclosed Declaration. It can be seen that samples prepared according to the method disclosed by

Arakawa et al. in which the raw powders are sifted through a 325 mesh sieve have oxide particles that do **NOT** necessarily or inherently have a mean particle diameter of less than 3μm. Particularly, the comparative Samples (i), (ii) and (iii) have mean particle diameters of 13μm, 4.3μm and 4.9μm respectively. This is true even when the comparative sample was prepared with an alloy material composition corresponding to that of the inventive samples. This demonstrates that samples prepared according to the method of Arakawa et al. using a sifting step through a 325 mesh sieve do **NOT** necessarily and inherently result in an actual mean particle diameter within the presently claimed range of less than 3μm. This is true both for comparative Sample (i) having a pertinent composition according to Arakawa et al. and comparative Samples (ii) and (iii) having compositions according to the present invention. Thus, it can be seen that the processing method according to Arakawa et al. does not inherently achieve the additional inventive feature of a mean particle diameter less than 3μm.

Furthermore, the evaluation results shown in the table on page 5 of the enclosed Declaration demonstrate that the comparative samples produced according to Arakawa et al. with a mean particle diameter of 3μm or more achieve a significantly worse (higher) electrode wear rate with a worse (lower) machining rate than that of the inventive samples according to the present application with a mean particle diameter less than 3μm. For example, as explained at the top of page 7 of the Declaration, the wear rate of the comparative Sample (i) according to Arakawa

et al. is two times (i.e. 200% of) the electrode wear rate of inventive Sample 1, while the inventive Sample 1 electrode operates with a machining rate that is 1.4 times the machining rate of the comparative Sample (i). As further set forth in the enclosed Declaration, such improvements are considered substantial and significant in the present field of electrodes for electrical discharge machining, and such improvements are unexpected based on the prior art disclosure of Arakawa et al. Such significantly improved and unexpected results achieved by the presently claimed inventive feature of a mean particle diameter less than 3μm critically and patentably distinguish the present invention over the broad general disclosure of Arakawa et al. regarding particle sizes less than 325 mesh or nominally less than 45μm.

Now turning to present independent claims 10, 19 and 37, these claims recite that the particles of the additional elements and/or a compound thereof have a mean interparticle spacing of at most 14μm. Similarly as discussed above regarding the mean particle diameter, the present application has demonstrated for the first time that providing such a small mean interparticle spacing of the additional element particles mixed into the basic W-Cu alloy provides an improved electrical discharge machining property and particularly an improved electrode wear resistance (see the present specification at page 17 lines 7 to 10 and Table 1, and page 18 lines 16 to 18 and Table 2).

As tacitly admitted by the Examiner, Arakawa et al. do not disclose such a small mean interparticle spacing. The Examiner has asserted that "*inter-particle size will be the same or less*

than the particle size" with no prior art support or scientific rationale to explain this assertion. Accordingly, this assertion is traversed. Also, this assertion is proven to be factually inapplicable to the present invention, because of the comparative testing results reported in the enclosed "Declaration of Unexpected Results Under 37 CFR 1.132". Similarly as discussed above in connection with the mean particle diameter, the results reported in the table on page 5 of the enclosed Declaration also show that particles of the additional element compounds having an interparticle spacing greater than the claimed maximum limit of 14μm achieve a worse electrode performance in terms of the electrode wear rate and the machining rate, in comparison to an inventive electrode alloy composition in which the additional element or compound particles have an interparticle spacing no more than 14μm. In this regard, also see the inventive samples reported in Tables 1 and 2 on pages 17 and 18 of the present specification.

Thus, the enclosed Declaration demonstrates that Arakawa et al. do **NOT** inherently disclose the presently claimed interparticle spacing, and that such a small interparticle spacing does not inherently result from the processing method disclosed by Arakawa et al. The enclosed Declaration further establishes that the presently claimed feature of a mean interparticle spacing of at most 14μm achieves significantly improved unexpected results in comparison to electrode alloy samples produced according to the method of Arakawa et al. Based on these unexpected results achieved by the critically limited

feature of the invention recited in claims 10, 19 and 37, these claims also would not have been obvious.

For the above reasons, the respective inventions of each of the independent claims 1, 10, 19, 28 and 37 are not anticipated by and would not have been obvious over Arakawa et al. The dependent claims are patentable already due to their dependence.

The Examiner is respectfully requested to withdraw the rejection of claims 1 to 45 in view of Arakawa et al.

6) Referring to the top of page 3 of the Office Action, the additional prior art made of record requires no particular comments because it has not been applied against the claims.

7) Favorable reconsideration and allowance of the application, including all present claims 1 to 55, are respectfully requested.

Respectfully submitted,

WFF:he:ks/4863
Enclosures:
Transmittal Cover Sheet
Term Extension Request
Form PTO-2038
Declaration of Unexpected Results

By _____
Walter F. Fasse
Patent Attorney
Reg. No.: 36132
Tel. 207-862-4671
Fax. 207-862-4681
P. O. Box 726
Hampden, ME 04444-0726

CERTIFICATE OF FAX TRANSMISSION:
I hereby certify that this correspondence with all indicated enclosures is being transmitted by telefax to (571) 273-8300 on the date indicated below, and is addressed to: COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450.

_____ 2/23/09
Name: Walter F. Fasse - Date: February 23, 2009